High-Conductance Thermal Interfaces Based on Carbon Nanotubes, Phase I

Completed Technology Project (2006 - 2006)

Project Introduction

We propose to develop a novel thermal interface material (TIM) that is based on an array of vertical carbon nanotubes (CNTs) for high heat flux applications. For high precision, spaceborne lasers and other high power devices critical to NASA's Science Mission Directorate, heat flux levels are projected to reach 100 W/cm2. The state-of-the-art in space-compatible thermal interface materials (TIMs) is limited to a maximum achievable thermal conductance of approximately 5 W/cm2

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C. Preliminary testing of our innovative TIM approach has demonstrated thermal conductance values of 33 W/cm2

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C, a nearly seven-fold increase. For an incident heat flux of 100 W/cm2, this corresponds to a temperature drop of only 3

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C, compared with 20

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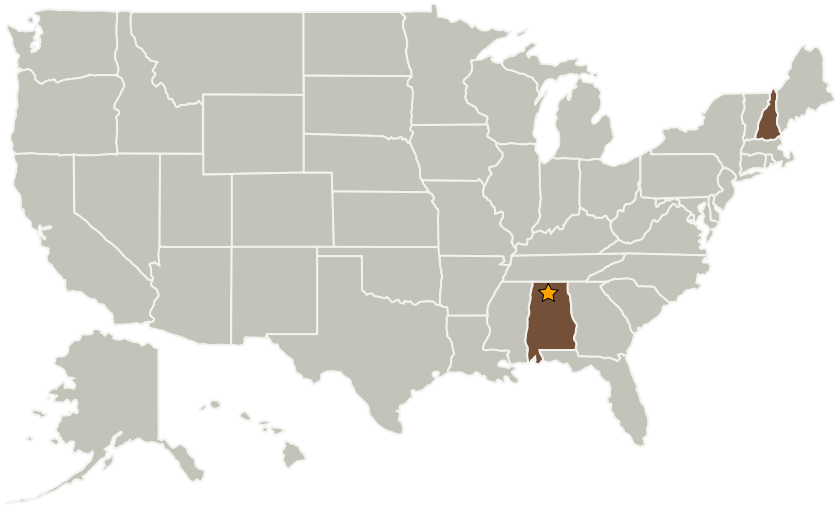
C for current technology. Thus, the use of our innovative CNT-based TIM will enable increased reliability, decreased size, and increased performance of spaceborne thermal management systems for the SMD.

Primary U.S. Work Locations and Key Partners



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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Marshall Space Flight Center (MSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Marshall Space Flight Center(MSFC)	Lead Organization	NASA Center	Huntsville, Alabama
Creare LLC	Supporting Organization	Industry	Hanover, New Hampshire

Primary U.S. Work Locations	
Alabama	New Hampshire

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX14 Thermal Management Systems
  - TX14.2 Thermal Control Components and Systems
    - TX14.2.3 Heat Rejection and Storage